UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/025,119	12/19/2001	Ari Hamalainen	3865/0K109	5808

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EXAMINER
BAYARD, EMMANUEL

ART UNIT	PAPER NUMBER
2638	

DATE MAILED: 02/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	10/025,119	HAMALAINEN, ARI
	Examiner	**Art Unit**
	Emmanuel Bayard	2638

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>30 November 2005</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

This is in response to amendment filed on 11/30/05 in which claims 1-14 are

pending. The applicant's amendments have been fully considered but they are moot

based on the new ground of rejection.

Claim Rejections - 35 USC § 103

1.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

2.   Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu

et al U.S. Patent No 6,307901 in view of Olivier et al U.S. Patent No 6,512,802.

As per claims 1 and 13-14 Yu et a teaches a method for performing channel

equalization in a receiver (see figs. 2, 5 and 7) in which a signal is received from a

communication channel, the signal containing symbols, channel estimation is performed

to estimate the properties of the communication channel, and samples are taken of the

received signal at intervals (see fig.3 element 58 and col.4, line13), wherein in the

method, a determined number of samples are examined (see fig.7 and col.3, lines 25-

30 and col.4, lines 5-6), a decision step is taken, in which, to find out the transmitted

symbols, the bit decisions are computed (see fig.7 element 202 and col.7, line 43-60) on

the basis of said defined quantity of samples, and after each decision step it is

examined whether said decision step is to be iterated (see fig.7 element YES or NO and

col.7, lines 60-67) wherein upon iteration of said decision step, at least some of the bit

decisions of the previous decision step are used in addition to the samples under

examination, in the computation of the bit decision (see fig.7, and col.7, lines 65-67 and

col.8, lines 1-10).

However Yu et al does not teach the signal containing symbols formed of binary

information by phase shift keying.

Olivier teaches the signal containing symbols formed of binary information by

phase shift keying (see col.2, line 50).

It would have been obvious to one of ordinary skill in the art to implement the

teaching of Olivier into Yu et al as to increase digital modulate radio signal transfer rates

and as taught by Olivier (see col.1, lines 20-25).

As per claims 2 and 6, Yu et al does teach performing said decision step (see

fig.7 element 202). Furthermore implementing a cost function which is defined as f (B)

= 1 2 t = 0 T (; r t - s = 0 H - 1 h s S (B t - s) r; 2 - s = 0 H - 1 h _ s h s S _ (B t - s) S (

B t - s) + k = 1 M (b t , k - 1 2) 2) ,in which S(B) is the symbol corresponding to bits B,

h.sub.s are the estimated channel coefficients, and r is the received signal which is

sampled, and that said cost function is subjected to minimization into Olivier and Yu

would have been obvious to one skilled in the art as to estimate the specific digital

impairment mapping levels by performing a digital impairment learning procedure.

As per claims 3 and 7, Yu et al does teach an update rule (see fig.7).

Furthermore implementing an update rule which is defined as l , k (j + 1) = f h (t = l l +

H - 1 re { r _ t h t - l S (B l) b l , k } - re { h _ t - l S _ (B l) b l , k q = 0 , t - q l H - 1 h q S

(B t - q) }) ,is used, where B.sub.l=.left brkt-bot.b.sub.l,1, b.sub.l,2, . . . , b.sub.l,M.right

brkt-bot. is M bits at the moment l=u+l.DELTA.u, S(B.sub.l) is the corresponding

symbol, 10 S (B I) b I , k is a derivative with respect to k bits, h indicates the

communication channel, of which H channel taps are estimated, and f.sub.h (x) is a

hard limit function which receives the value 1, if x>0, else 0 into the combination of Yu

and Olivier would have been obvious to one skilled in the art as to determine whether

the number of iterations completed equals a predetermined iteration.

As per claim 4, Yu and Olivier in combination would teach wherein in the update

rule, noise is added before taking said decision step as to determine whether the

number of iterations completed equals a predetermined iteration.

As per claim 5, Yu et al teaches a receiver comprising means for receiving (see

figs. 2, 5 and 7) a signal from a communication channel, a channel estimator for

estimating the properties of the communication channel, a channel equalizer (see figs.5,

7 elements 100, 208) , and means for sampling the received signal at intervals, wherein

the channel equalizer comprises means for examining a number of samples defined at

the time, decision means for computing bit decisions (see fig.7 element 202) on the

basis of said defined number of samples to find out the transmitted symbols, and

examining means for estimating the need for iterating the computation of the bit

decisions (see fig.7 element YES or NO), wherein upon iterating said computation of bit

decisions, at least some of the bit decisions of the previous decision step are arranged

to be used in addition to the samples under examination at the time (see fig.7 and col.7,

lines 65- col.8).

However Yu et al does not teach the signal containing symbols formed of binary information by phase shift keying.

Olivier teaches the signal containing symbols formed of binary information by phase shift keying (see col.2, line 50).

It would have been obvious to one of ordinary skill in the art to implement the teaching of Olivier into Yu et al as to increase digital modulate radio signal transfer rates and as taught by Olivier (see col.1, lines 20-25).

As per claim 8, Yu does teach comprising computing units, each of which are arranged to determine one symbol value on the basis of said defined number of samples, and the output of each computing unit is coupled to the input of at least one other computing unit, for using the symbol values defined by the computing units in the next computation of the bit decision (see fig.7 element 206 and col.7, lines 65- col.8).

As per claim 9, Olivier does teach wherein each computing unit contains as many iteration blocks as the bit number of symbols formed in the modulation (see col.3, lines 17-30 and col.5, lines 11-35). Furthermore implementing such teaching into Yu et al would have been obvious to one skill in the art as to determine whether the number of iterations completed equals a predetermined iteration.

As per claim 10, Yu and Olivier would teach wherein the means for examining the number of samples determined each time comprise (delay line) in which the number of delays is one less than the number of symbols to be determined from said defined number of samples as to determine whether the number of iterations completed equals a predetermined iteration.

As per claim 11, Yu and Olivier would teach means for adding noise in the update rule before computing said bit decisions as to determine whether the number of iterations completed equals a predetermined iteration.

As per claim 12, Olivier teaches comprising means for setting an initial value (see col.3, lines 20-30) for the bits before computing said bit decisions. Furthermore implementing such teaching into Yu et al would have been obvious to one skill in the art as to determine whether the number of iterations completed equals a predetermined iteration.

Conclusion

3.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hamilton U.S. Patent No 6,100,835 teaches a multi-symbol analysis for digital symbol determination.

Bar-David et al U.S. Patent No 6,459,728 B1 teaches iterative channel estimation.

Long et al U.S. Patent No 6,636,650 B1 teaches a method and apparatus for automatically positioning images.

Bahl et al U.S. Patent No 5,970,239 teaches an apparatus and method for performing estimation.

Papasakellariou U.S. Patent No 6,700,919 B1 teaches channel estimation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Bayard whose telephone number is 571 272

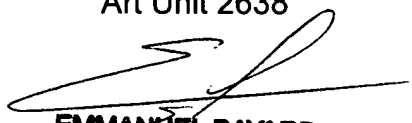3016. The examiner can normally be reached on Monday-Friday (7:Am-4:30PM)

Alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Vanderpuye Kenneth can be reached on 571 272 3078. The fax phone

number for the organization where this application or proceeding is assigned is 571-

273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

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Business Center (EBC) at 866-217-9197 (toll-free).

Emmanuel Bayard
Primary Examiner
Art Unit 2638

2/11/06

EMMANUEL BAYARD
PRIMARY EXAMINER